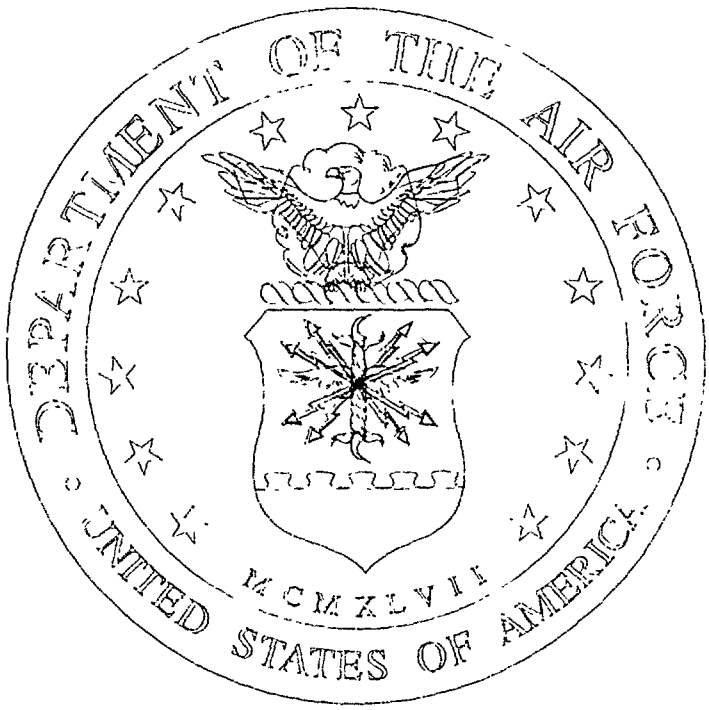
# AIR FORCE
# INSTALLATION RESTORATION PROGRAM

EXPLANATION OF SIGNIFICANT DIFFERENCES
FINAL

SOIL OPERABLE UNIT SITES
AND GROUNDWATER OPERABLE UNIT PLUMES
RECORD OF DECISION FOR SITES 56, 59, AND 60




AIR FORCE CENTER FOR ENVIRONMENTAL EXCELLENCE

AIR FORCE BASE CONVERSION AGENCY
MATHER, CALIFORNIA

DECEMBER 1998

# *Explanation of Significant Differences*
# *Final*
# *Basewide Operable Unit Sites*
# *and Groundwater Operable Unit Plumes*
# *Record of Decision for Sites 56, 59, and 60*

*Mather Air Force Base*
*Sacramento County, California*

*December 1998*

RL/12-98/ES/3920002.AWS

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| | |
|---|---|
| AFB | Air Force Base |
| ARAR | applicable or relevant and appropriate requirement(s) |
| ATC | Air Training Command |
| bgs | below ground surface |
| CERCLA | Comprehensive Environmental Response, Compensation, and Liability Act of 1980 |
| COC | contaminant(s) of concern |
| DTSC | Department of Toxic Substances Control |
| ESD | explanation of significant difference |
| ft | feet |
| CBRA | Comprehensive Mather Baseline Risk Assessment |
| NCP | National Oil and Hazardous Substances Pollution Contingency Plan |
| OU | Operable Unit |
| OWS | oil/water separator |
| PCE | tetrachloroethene |
| PNA | polynuclear aromatic hydrocarbon(s) |
| ppm | part(s) per million |
| RCI | Remedial Contractors, Inc |
| ROD | Record of Decision |
| SVE | soil vapor extraction |
| TCE | trichloroethene |
| TPH | total petroleum hydrocarbon(s) |
| USAF | United States Air Force |
| USEPA | United States Environmental Protection Agency |
| VOC | volatile organic compound(s) |
| $yd^3$ | cubic yard(s) |

# 1.0 Introduction

This decision document presents an explanation of significant difference (ESD) from the *Final Superfund Record of Decision Soil Operable Unit Sites and Groundwater Operable Unit Plumes at Mather Air Force Base, Sacramento County, California* [USAF, 1996] for Sites 56, 59, and 60. This ESD is developed in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA), as amended by the Superfund Amendments Reauthorization Act of 1986 and, to extent practicable, the National Oil and Hazardous Substances Pollution Contingency Plan (NCP). Section 117(c) of CERCLA requires that if proposed actions differ in any significant respects from the final actions agreed to in the Record of Decision (ROD), the lead agency (i.e., U.S. Air Force [USAF]) must publish an explanation of the significant difference which states the reasons for such changes. This ESD follows recommendations in the U.S. Environmental Protection Agency (USEPA) document titled *Interim Final Guidance on Preparing Superfund Decision Documents* [USEPA, 1989].

The preferred remedial alternative at Sites 56, 59, and 60, as documented in the ROD [USAF, 1996], is excavation of the fuel-impacted soils with *ex situ* bioremediation treatment and onbase disposal. However, during initial remediation work (i.e., excavation) conducted by Montgomery Watson, it was observed that a greater than anticipated volume of contaminated soil would require excavation to achieve prescribed cleanup goals. Based on the initial activities, it is estimated that the additional volume of soil requiring excavation would range from five to ten times the original estimates. In addition, contamination is anticipated to be found under existing buildings which would necessitate demolition activities. Therefore, *in situ* treatment consisting of soil vapor extraction (SVE) and/or bioventing is proposed as the preferred cleanup alternative at all three sites. *In situ* treatment is recommended due to the following:

- site characteristics are favorable for treatment
- additional excavation and building demolition is cost prohibitive.

Additionally, the proposed remedy provides an opportunity to investigate the presence and significance of subsurface contaminants of concern (COCs) in excess of prescribed cleanup levels and the presence of chlorinated solvents (e.g., tetrachloroethene [PCE], trichloroethene [TCE]) in soil gas. During the Group 3 Remedial Investigation [IT, 1993], chlorinated solvents were detected in soil organic vapor (SOV) samples. These constituents were also detected at low levels during initial remediation work but they have not been determined to be COCs. The

USAF is the owner of Sites 56, 59, and 60; is the responsible party for the contamination; and has been delegated authority by executive order to provide the necessary remedial action consistent with the NCP and CERCLA Section 104. The USEPA Region IX and the State of California provide regulatory support and concurrence for the investigations and cleanup activities through the *Federal Facilities Agreement Under CERCLA* [USAF, 1989]. The Department of Toxic Substances Control (DTSC) is the designated single state agency to represent the State of California to ensure compliance with appropriate California laws and regulations. To be approved, this ESD only requires signature from the USAF as the lead agency. The USEPA and the State of California will have a thirty-day opportunity to dispute this draft final ESD in accordance with the terms of the Federal Facilities Agreement [USAF, 1989]. Responses to regulatory comments, on the draft ESD, made by the USEPA, California Regional Water Quality Control Board, and the California DTSC have been included as Appendix B.

This ESD was available for public review and comment during a 30-day comment period which ended on June 30, 1998. No comments were received from the public on this ESD. This ESD, once finalized, will be included in the Administrative Record for the Soil Operable Unit (OU) Sites and Groundwater OU Plumes as required in Section 300.825 (a)(2) of the NCP. The Administrative Record is located at 10503 Armstrong Ave, Mather, California, and is open for inspection by the public, weekdays between the hours of 8:00 a.m. and 4:00 p.m. The Administrative Record is also available for review at the Rancho Cordova Community Library. The library is located at 9845 Folsom Blvd., Sacramento, California 95827, and is open Tuesday from 1:00 p.m. to 8:00 p.m.; Wednesday 11:00 a.m. to 6:00 p.m.; Thursday 11:00 a.m. to 8:00 p.m.; and Friday and Saturday 1:00 p.m. to 5:00 p.m. (hours subject to change without notice). A one-month public comment period was required for this ESD, prior to which the USAF provided written notice in the *Sacramento Bee* and the *Grapevine Independent Newspaper*. Additionally, a public information briefing, with a question and answer session, was held at the June 10, 1998, Restoration Advisory Board meeting.

## 2.0 Summary of Site Histories, Contamination Problems, and Selected Remedies

This section provides a brief site history, summary of the contamination problems, and selected remedies for Sites 56, 59, and 60. In addition, a summary of the individual site remedies is provided as originally described in the Final Soil Operable Unit Sites and Groundwater Operable

Unit Plumes Record of Decision [USAF, 1996]. Further details can also be found in the Administrative Record.

## 2.1 Site Histories and Contamination Problems

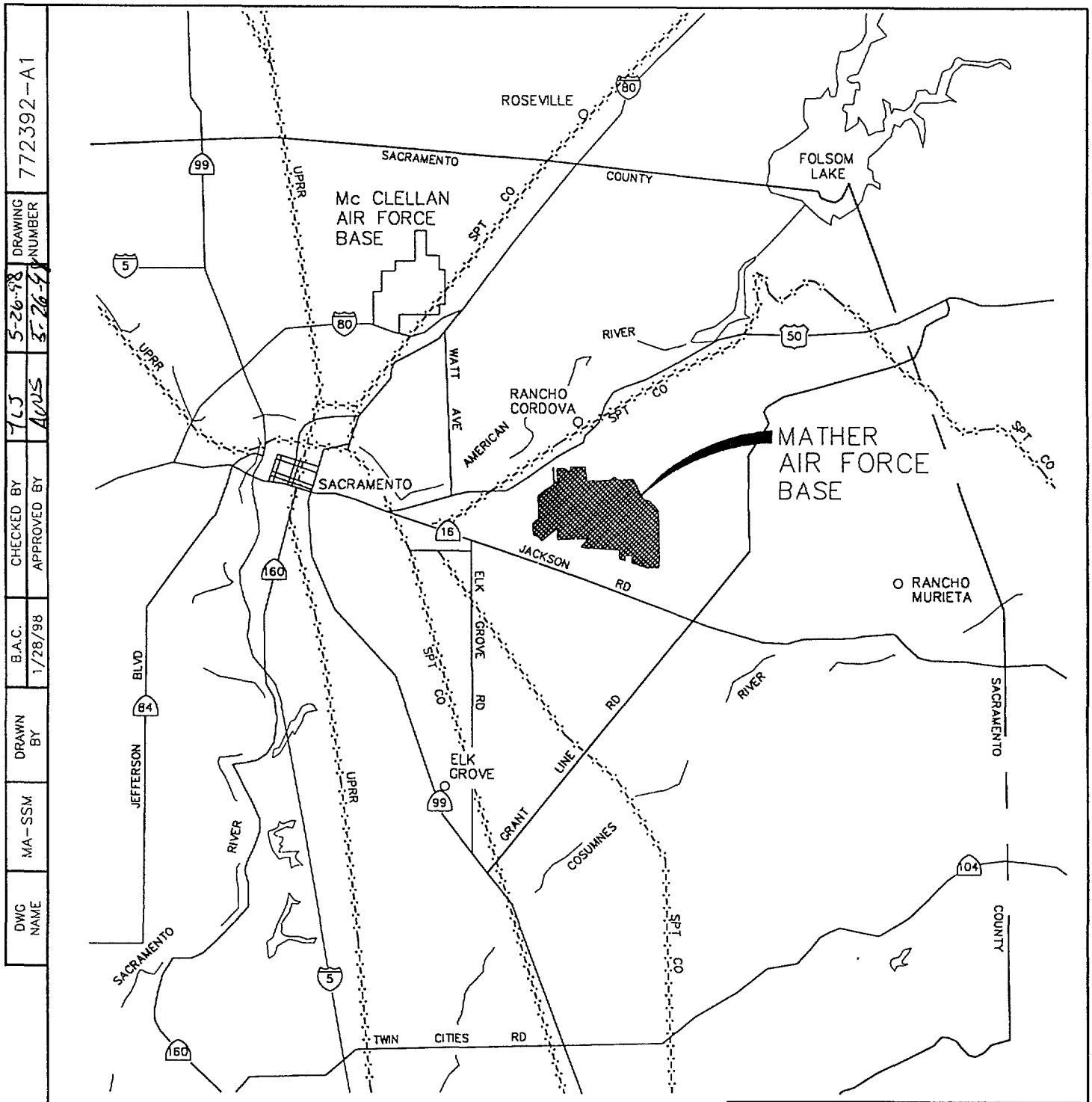
Mather Air Force Base (AFB) is a former military facility located approximately ten miles east of Sacramento in Sacramento County, California as shown in Figure 1. Mather AFB closed on September 30, 1993, pursuant to the Base Realignment and Closure Act. At the time of closure, the base encompassed approximately 5,845 acres in an unsurveyed part of Township 8 North, Ranges 6 East and 7 East. Most of the base is currently leased to Sacramento County for use as a commercial airport and regional park.

During remedial investigation activities conducted at the subject sites, fuel contamination was identified in the shallow soils. Chemicals of concern were identified based on protection of groundwater quality and human health, which consisted of total petroleum hydrocarbons (TPH) measured as diesel, TPH measured as gasoline, polynuclear aromatic hydrocarbons (PNAs), oil and grease, and/or metals. Although chlorinated solvents were detected in the soil gas or soil at these sites, they were not determined to be COCs [IT, 1995a] since soil gas detections were not considered in the COC determination process or the detected soil concentrations were below constituent-specific Total Designated Levels for each site. The following subsections describe the history and individual contamination problems associated with each site.

### 2.1.1 Site 56 - Oil/Water Separator 2989

Site 56 consists of the former location of oil/water separator (OWS) 2989 and two former OWS facilities in the eastern portion of the Main Base (Figure 2). Oil/water separator 2989 received wastewater generated at the Old Motor Pool washrack, and treated and discharged the wastewater to the sanitary sewer system. The following materials were reportedly contained in the wastewater: fuels, oil and grease, antifreeze, and possibly cleaning fluids [MW, 1997a].

Investigative activities have identified contamination in the surface soils and shallow subsurface soils. As identified in the Groundwater Operable Unit and Soil Operable Unit Focused Feasibility Study Report [IT, 1995a], COCs include TPH measured as diesel, TPH measured as gasoline, metals, PNAs, and oil and grease. The identified basis for cleanup was protection of human health and groundwater quality. The Final Comprehensive Mather Baseline Risk Assessment (CBRA) [IT, 1995b] identified a cumulative current site risk of $3.3 \times 10^{-4}$ and future




SCALE

0 6 12 MILES

FIGURE 1

MATHER
SITE VICINITY MAP
PREPARED FOR
MATHER AIR FORCE BASE
SACRAMENTO, CALIFORNIA

INTERNATIONAL TECHNOLOGY CORPORATION

| DWG NAME | MA-SSM | DRAWN BY | B.A.C. 1/28/98 | CHECKED BY | APPROVED BY | DRAWING NUMBER | 772392-A1 |
|---|---|---|---|---|---|---|---|
| | | | | TLS | Aws | 5-26-98 & 5-26-98 | |

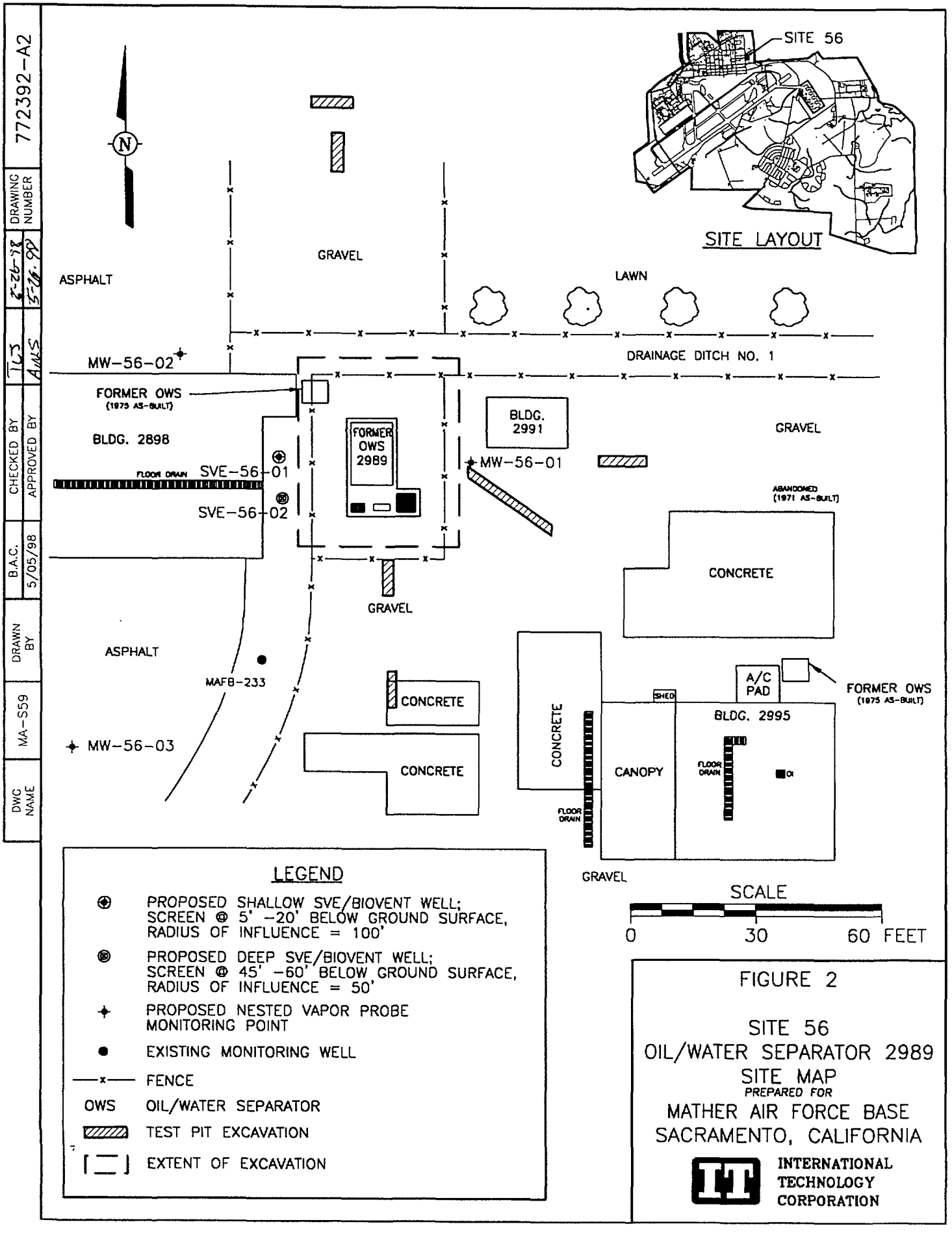



FIGURE 2

SITE 56
OIL/WATER SEPARATOR 2989
SITE MAP
*PREPARED FOR*
MATHER AIR FORCE BASE
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site risk of $8x10^{-4}$ under a residential land-use scenario. Risks identified in the CBRA [IT, 1995b] are associated with contaminants present in the surface soils (i.e., maximum of three feet below land surface). However, these soils were removed from the site during initial remediation work conducted by Montgomery Watson in 1996.

### 2.1.2 Site 59 - Oil/Water Separator 4251

Site 59 consists of the former location of OWS 4251, in the southern portion of the Main Base at the Air Training Command (ATC) washrack, approximately 20 feet northeast of Building 4249 (Figure 3). Oil/Water Separator 4251 was constructed in 1969 and received wastewater generated from the ATC washrack. The wastewater reportedly contained fuels, oil and grease, hydraulic fluid, and antifreeze.

Contamination at the site has been identified in the shallow subsurface soils. The COCs identified at the site are TPH measured as diesel and gasoline. The identified basis for cleanup was protection of human health and groundwater quality.

### 2.1.3 Site 60 - Oil/Water Separator 6900

Site 60 consists of the former location of OWS 6900, in the Strategic Air Command area where it supported Building 7005 (Figure 4). Building 7005 was an aircraft maintenance hanger used for aircraft fuel-system maintenance. A large floor (trench) drain within the hanger was used to collect fuel, that may have been spilled from an aircraft, which then emptied into the OWS. It is reported that TCE, PCE, methyl ethyl ketone, and other solvents were used in Building 7005.

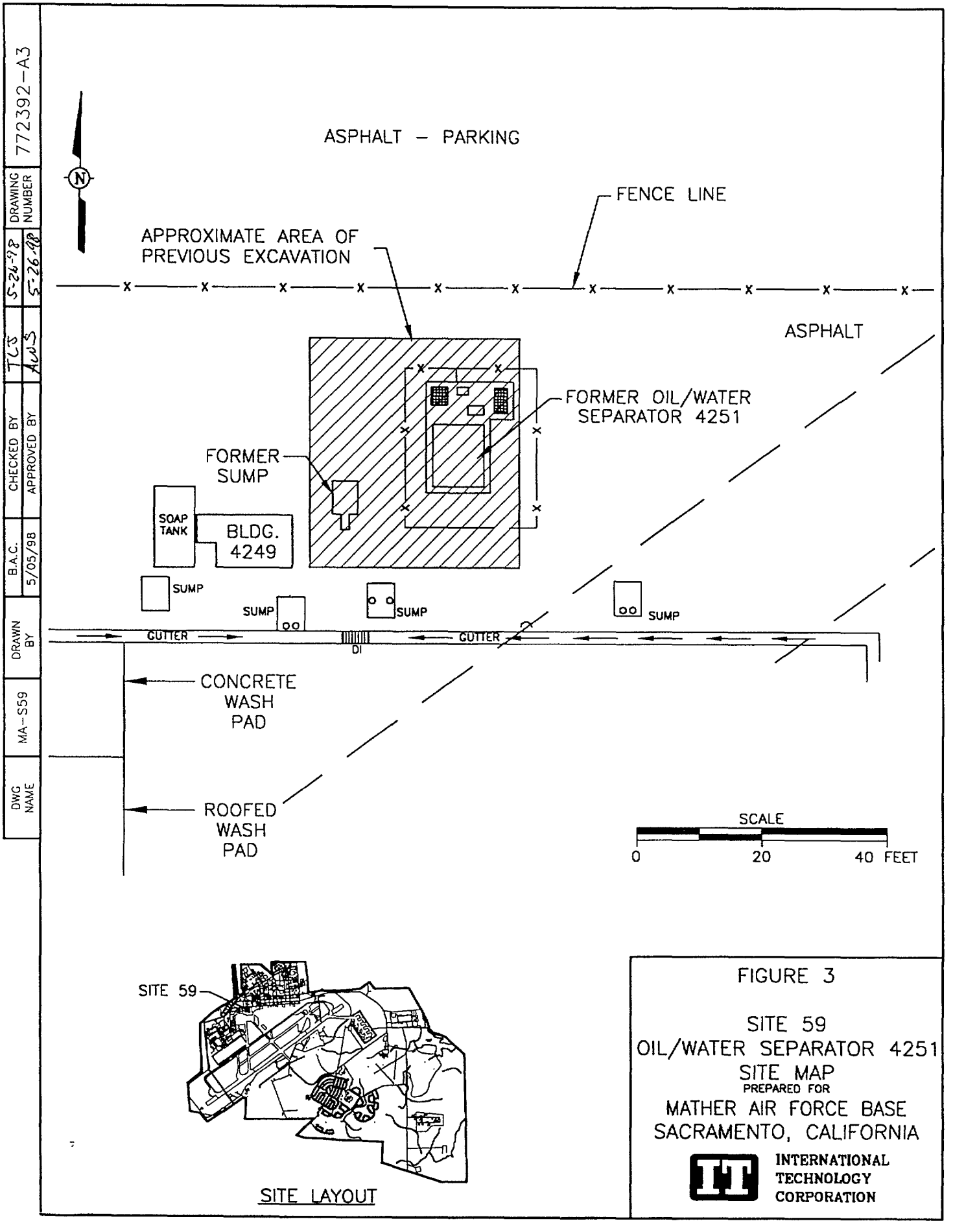
Contamination at the site has been identified in the shallow subsurface soils. The COCs at the site are TPH measured as gasoline and xylenes. The identified basis for cleanup was protection of human health and groundwater quality.

## 2.2 Description of Selected Remedy

The following subsections present a summary of the individual site remedies selected for Sites 56, 59, and 60 as originally described in the ROD [USAF, 1996].

### 2.2.1 Site 56 Selected Remedy

Alternative 56.3 was selected by the USAF, with concurrence of the USEPA and the State of California, as the preferred remedy for Site 56 [USAF, 1996]. The alternative consisted of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CHECKED BY
APPROVED BY
B.A.C.
5/05/98
DRAWN BY
MA-S59
DWG NAME
ASPHALT – PARKING
FENCE LINE
APPROXIMATE AREA OF PREVIOUS EXCAVATION
ASPHALT
FORMER OIL/WATER SEPARATOR 4251
FORMER SUMP
SOAP TANK
BLDG. 4249
SUMP
SUMP
SUMP
SUMP
GUTTER
GUTTER
DI
CONCRETE WASH PAD
ROOFED WASH PAD
SCALE
0
20
40 FEET
SITE 59
SITE LAYOUT
FIGURE 3
SITE 59
OIL/WATER SEPARATOR 4251
SITE MAP
PREPARED FOR
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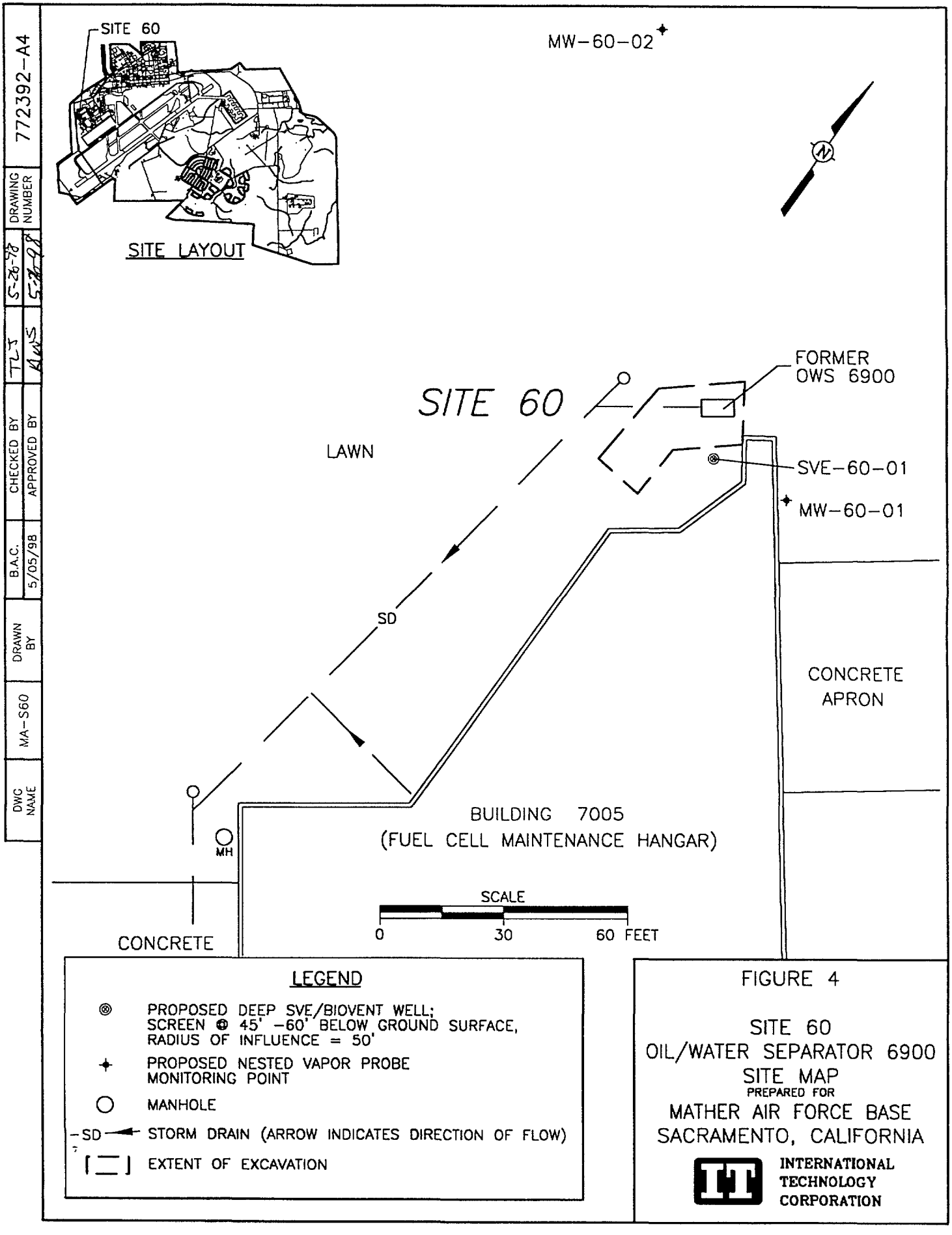
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MA-S60
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B.A.C.
5/05/98
CHECKED BY
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TLJ
AWS
5-26-98
5-27-98
DRAWING NUMBER
772392-A4
SITE 60
SITE LAYOUT
MW-60-02
FORMER OWS 6900
SITE 60
LAWN
SVE-60-01
MW-60-01
SD
CONCRETE APRON
BUILDING 7005
(FUEL CELL MAINTENANCE HANGAR)
MH
CONCRETE
SCALE
0
30
60 FEET
LEGEND
PROPOSED DEEP SVE/BIOVENT WELL; SCREEN @ 45' -60' BELOW GROUND SURFACE, RADIUS OF INFLUENCE = 50'
PROPOSED NESTED VAPOR PROBE MONITORING POINT
MANHOLE
-SD- STORM DRAIN (ARROW INDICATES DIRECTION OF FLOW)
EXTENT OF EXCAVATION
FIGURE 4
SITE 60
OIL/WATER SEPARATOR 6900
SITE MAP
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MATHER AIR FORCE BASE
SACRAMENTO, CALIFORNIA
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excavating the contaminated surface and shallow subsurface soils, transporting the soils to the onbase *ex situ* bioremediation facility for treatment, and then transporting the treated soils to Site 4 or Site 7 for onsite disposal. If however, the excavated soils contained constituents above hazardous levels, then the excavated soils were to be transported offbase for disposal. The major components of this remedial alternative included:

- excavating approximately 1,110 cubic yards ($yd^3$) of contaminated surface and shallow subsurface soils;
- transporting the excavated soils to the onbase *ex situ* bioremediation facility;
- treating the excavated soils by *ex situ* bioremediation, as appropriate;
- transporting the treated soils to, and consolidating them with landfill cap foundation materials at Site 4 or Site 7, as appropriate; and
- monitoring the groundwater if contamination that may threaten groundwater quality remains at the site.

However, this ESD augments the remedy selected in the ROD for Site 56 to change to *in situ* treatment from *ex situ* treatment and delete the associated onsite disposal component. Details of the proposed remedy are presented in Section 3.1.1. The basis for cleanup at Site 56 is protection of human health and mitigating a potential source of current/future groundwater contamination to protect groundwater quality for its beneficial uses. Table 1 presents the Site 56 cleanup levels prescribed in the ROD [USAF, 1996].

**Table 1. Site 56 Cleanup Levels**

| Contaminant of Concern | Cleanup Level (ppm) |
|---|---|
| ***Surface Soil*** | |
| Arsenic | 22 |
| Benzo(a)anthracene | 0.33 |
| Benzo(a)pyrene | 0.33 |
| Benzo(b)fluoranthene | 0.33 |
| Chrysene | 0.33 |

**Table 1. Site 56 Cleanup Levels**
**(Continued)**

| Contaminant of Concern | Cleanup Level (ppm) |
|---|---|
| Dibenz(a,h)anthracene | 0.33 |
| Lead | 130 |
| Oil and Grease | 430 |
| TPH measured as Diesel | 100 |
| *Subsurface Soil* | |
| Oil and Grease | 430 |
| TPH measured as Diesel | 100 |
| TPH measured as Gasoline | 5 |

TPH = total petroleum hydrocarbon ppm = parts per million

### 2.2.2 Site 59 Selected Remedy

Alternative 59.2 was selected by the USAF, with concurrence of the USEPA and the State of California, as the preferred remedy for Site 59 [USAF, 1996]. The major components of this remedy included:

- excavating approximately 1,200 $yd^3$ of contaminated shallow subsurface soils;
- transporting the excavated soils to the onbase *ex situ* bioremediation facility;
- treating the excavated soils by *ex situ* bioremediation, as appropriate;
- transporting the treated soils to, and consolidating them with landfill cap foundation materials at Site 4 or Site 7, as appropriate; and
- monitoring the groundwater if contamination that may threaten groundwater quality remains at the site.

However, this ESD augments the remedy selected in the ROD for Site 59 to change to *in situ* treatment from *ex situ* treatment and delete the associated onsite disposal components. Details of the proposed remedy are presented in Section 3.1.2. The basis for cleanup at Site 59 is protection of human health and mitigating a potential source of current/future groundwater contamination to

protect groundwater quality for its beneficial uses. Table 2 presents the Site 59 cleanup levels prescribed in the ROD [USAF, 1996].

**Table 2. Site 59 Cleanup Levels**

| Contaminant of Concern | Cleanup Level (ppm) |
|---|---|
| *Subsurface Soil* | |
| TPH measured as Diesel | 10 |
| TPH measured as Gasoline | 1 |

TPH = total petroleum hydrocarbon ppm = parts per million

### 2.2.3 Site 60 Selected Remedy

Alternative 60.2 was selected by the USAF, with concurrence of the USEPA and the State of California, as the preferred remedy for Site 60 [USAF, 1996]. The major components of this remedy included:

- excavating approximately 350 $yd^3$ of contaminated shallow subsurface soils;
- transporting the excavated soils to the onbase *ex situ* bioremediation facility;
- treating the excavated soils by *ex situ* bioremediation, as appropriate;
- transporting the treated soils to, and consolidating them with landfill cap foundation materials at Site 4 or Site 7, as appropriate; and
- monitoring the groundwater if contamination that may threaten groundwater quality remains at the site.

However, this ESD augments the remedy selected in the ROD for Site 60 change to *in situ* treatment from *ex situ* treatment and delete the associated onsite disposal components. Details are presented in Section 3.1.3. The basis for cleanup at Site 60 is protection of human health and mitigating a potential source of current/future groundwater contamination to protect groundwater quality for its beneficial uses. Table 3 presents the Site 60 cleanup levels prescribed in the ROD [USAF, 1996].

**Table 3. Site 60 Cleanup Levels**

| Contaminant of Concern | Cleanup Level (ppm) |
|---|---|
| *Subsurface Soil* | |
| TPH measured as Gasoline | 5 |
| Xylenes | 17 |

TPH = total petroleum hydrocarbon ppm = parts per million

### 2.3 Public Involvement

The public requirements of CERCLA and the NCP were met prior to selection of the remedy in the ROD. The public comment period for the *Proposed Plan for Environmental Cleanup at the Groundwater Operable Unit Plumes and Soil Operable Unit Sites* [IT, 1995c] at Mather AFB, began on May 8, 1995 and ended on June 7, 1995. A public meeting was held on May 18, 1995, at which the proposed plan was summarized, and questions and public comments solicited. The transcript from the public meeting is included in the Administrative Record File. Written comments received from the USEPA and County of Sacramento are also included in the Administrative Record. No comments were received which dealt with Sites 56, 59, or 60.

Following final issuance of this ESD, the USAF will meet the requirements of the NCP by placing it in the Administrative Record. Additionally, the USAF has made this ESD available for public review (comment period ended June 30, 1998) and published a notice in a major local newspaper that briefly summarized the change in remedies and the reasons for the differences. In addition, a briefing and question and answer session was held at the Restoration Advisory Board meeting on June 10, 1998. No comments were received from the public on this ESD.

## 3.0 Description of Significant Differences and the Basis for those Differences

This section presents a summary of the events and information which require the ESD to be prepared. Additionally, descriptions of the significant differences between the remedies presented in the ROD [USAF, 1996] and the actions now proposed are presented.

### 3.1 Basis for the Significant Differences

Sites 56, 59, and 60 have been targeted as those areas that require significant changes that add technologies to the selected remedies identified in the ROD [USAF, 1996]. To the extent that this ESD differs from the ROD, it supersedes it. The following subsections describe the basis for changes to the selected site-specific remedies.

#### 3.1.1 Basis for the Significant Differences to the Selected Remedy for Site 56

Excavation with *ex situ* bioremediation and on base disposal was the original remedial action selected and carried out for Site 56. Excavation activities were conducted from August 21 to September 30, 1996, by Remedial Contractors, Inc. (RCI) of Stockton, California with oversight by Montgomery Watson. During activities, it was noted that the volume of contaminated soil would be much larger than originally anticipated to achieve the cleanup standards. Following the removal of approximately 1,150 $yd^3$ of soil to a depth of 19 feet (ft) below ground surface (bgs), confirmatory sampling indicated concentrations were in excess of the specified cleanup levels (i.e., 100 parts per million [ppm] for TPH measured as diesel, five ppm for TPH measured as gasoline, and 430 ppm for oil and grease) [MW, 1997a and MW, 1997b]. Based on observations of the excavation and investigative sampling, it was estimated that the volume of contaminated soil that would need to be excavated had increased by a factor of five. Furthermore, demolition of Buildings 2898 and 2991 would be required to pursue excavation as a remedial alternative. These buildings have currently been slated for use by the county, and the cost to rebuild made excavation undesirable.

#### 3.1.2 Basis for the Significant Differences to the Selected Remedy for Site 59

Excavation and treatment of the shallow soils by *ex situ* bioremediation and on base disposal was the original remedial action chosen and implemented for Site 59. Excavation and investigation activities were performed at Site 59 from August 22 to September 6, 1996, by RCI with oversight by Montgomery Watson. Two OWS structures were removed and disposed and approximately 750 $yd^3$ of contaminated soils were excavated. During excavation, it was noted that subsurface contamination of an unknown hydrocarbon in excess of designated cleanup levels for Site 59 was present and that an estimated total of 7,500 $yd^3$ (almost ten times the originally estimated volume) would need to be removed. Excavation walls showed visible signs of contamination at depths of 10 to 22 ft bgs with the majority of contamination at depths between 16 and 22 ft bgs. The source of contamination appeared to be attributed to the removed OWS 4251. The contaminated soils consisted of small to medium cobbles in a sandy, silty matrix. The

contaminant lens was stained light gray. Strong petroleum odors were evident, and the photo ionization detector reading ranged from 800 to 1,800 ppm. Investigative excavation east of the original excavation was performed to better define and delineate the horizontal extent of soil contamination. No investigative trenching was performed north, south, or west of the site due to interference with site structures and trenching equipment limitations [MW, 1997a]. Furthermore, demolition of Building 4249 and the concrete washrack would be required to pursue excavation as a remedial alternative. Removal and reconstruction of these facilities would make excavation an undesirable alternative.

### *3.1.3 Basis for the Significant Differences to the Selected Remedy for Site 60*

Excavation with *ex situ* bioremediation and on base disposal was the original remedial action selected and implemented for Site 60. Excavation and investigation activities were performed at Site 60 from August 13 to September 17, 1996, by RCI with oversight by Montgomery Watson. Oil/water separator 6900 was removed from the site and approximately 400 $yd^3$ of soil were removed. However, during excavation it was noted that the volume of contaminated soil was larger than anticipated. The highest concentration remaining at the site was 2,000 ppm of unknown volatile hydrocarbons at a depth of approximately 30 ft bgs. Visible signs of contamination were evident in the excavation walls at depths ranging from 15 to 30 ft bgs. The contaminated soils consisted of small to medium cobbles with a sandy matrix. The contaminated soils were stained gray and had a very strong hydrocarbon odor. Photoionization detector readings of the contaminated soils typically ranged from 1,200 to 2,100 ppm. Detections of unknown volatile hydrocarbons were found at a depth of 30 ft bgs. The vertical extent of contamination could not be determined because excavation to greater depths was not achievable due to the proximity of Building 7005. Photoionization detector readings and laboratory analytical data indicated that contaminant concentrations were remaining consistent with depth. The contamination appeared to decrease laterally to the north, south, and west; however, the lateral extent of the contamination appeared to extend to the east below Building 7005.
No investigative trenching was performed to define the eastern extent of contamination due to obstructions with Building 7005 [MW, 1997a]. Complete excavation of all contaminated soils proved to be impractical due to the high value of the hanger overlying the potentially contaminated soils. The cost of demolition and reconstruction of this building would make this option cost prohibitive.

### 3.2 Description of the Significant Differences

Sites 56, 59, and 60 have been shown to require remedial action in addition to that stated in the ROD [USAF, 1996]. The following subsections describe the actual significant differences in scope, performance, and cost to the selected site-specific remedy.

#### 3.2.1 Significant Differences to the Selected Remedy at Site 56

Since cleanup levels of contaminated soils were not achieved to complete the remediation of Site 56, and removal of the required soils and replacement of existing structures would be cost prohibitive, installation of an *in situ* treatment system (i.e., SVE/bioventing) would be the preferred choice of remediation. The selected remedy would potentially prevent migration of petroleum hydrocarbons from the surface and subsurface soils into the groundwater. Installation of vapor extraction wells will allow additional soil gas data, including chlorinated solvent data, to be collected and evaluated. The status of chlorinated solvents as a potential COC at these sites may be reevaluated at the end of *in situ* treatment operation prior to system shut-down. If they are identified as COCs, and they persist at concentrations exceeding remediation standards, then continued operation of the treatment system may be required to address chlorinated solvents. Additionally, applicable or relevant and appropriate requirements (ARARs) associated with remediation of chlorinated solvents will be identified at the time they are determined to be COCs. The following remedial actions are proposed for Site 56:

- installation of injection/extraction wells and monitoring points;
- pilot test to optimize the efficiency and cost of the SVE and/or the bioventing system;
- startup, operation, and maintenance of the system (including a potential switch from SVE to bioventing); and
- closure of the site after remedial goals have been met [MW, 1997b].

Preliminary information indicates SVE would be the probable remedy since the contamination may present a potential threat to groundwater and the site-specific characteristics are suitable for SVE technology. However, a pilot test will be conducted at the site to determine the levels and types of contaminants present. If the pilot test indicates levels of volatile organic compounds (VOCs) which warrant remediation, SVE would be selected as the preferred remedy. However, if the pilot test indicates that VOCs are not at elevated levels, then an alternate means of remediation, i.e., bioremediation, would be implemented to remediate the diesel contamination.

However, depending on the results of the pilot test, it may be necessary to install a dual SVE/bioventing system.

If SVE is the chosen remedy, the USAF shall operate the SVE system until it makes the demonstration that the cleanup standard, specified in the ROD [USAF, 1996] and Table 1 of this ESD, has been met. Although chlorinated solvents (i.e., VOCs) were not confirmed at Site 56, the USAF shall continue to operate the SVE system if appropriate, after considering the following factors:

- whether the mass removal rate is approaching asymptotic levels after temporary shutdown periods and appropriate optimization of the SVE system;
- the additional cost of continuing to operate SVE system at concentrations approaching asymptotic mass levels;
- whether the predicted concentration of the leachate from the vadose zone using VLEACH or another appropriate vadose zone model that interprets soil gas data will exceed the groundwater cleanup standard;
- the predicted effectiveness and cost of further enhancements to the SVE system (e.g., additional vapor extraction wells);
- whether the cost of groundwater remediation will be significantly more if the residual vadose zone contamination is not addressed;
- whether the residual mass in the vadose zone will significantly prolong the time to attain the groundwater cleanup standard; and
- the incremental cost over time of vadose zone remediation compared to the incremental cost over time for groundwater remediation on the basis of a common unit (e.g., cost of a pound of TCE removed) provided that the underlying groundwater has not reached aquifer cleanup levels.

For costing purposes, the proposed *in situ* system for Site 56 will consist of two injection wells, three multi-level monitoring wells, a treatment unit, and various instrumentation and control valves. Following success of the pilot test and further refinement of the contaminant profile, the system would be modified as necessary to achieve its stated objectives. Soil gas data will also be collected concurrently with the evaluation and design to further define the presence of VOC contamination. Off gas treatment is not known at this time but it is anticipated that granulated

activated carbon or a more cost effective means of best available control treatment as necessary to comply with ARARs will be used.

The cost of the original alternative of excavation with *ex situ* bioremediation and on base disposal was estimated at $47,582. This alternative excavated surface and shallow subsurface soils and used *ex situ* bioremediation to treat the soil followed by onbase disposal. It was chosen as the preferred cleanup option because it provided the most cost effective removal of the contaminated soil. However, based on the amount of soils excavated at the site and the concentration of the soils remaining in place, the Remedial Action Contractor estimated the remaining contaminated soil in place to be approximately five times the original estimate. This made excavation as compared to SVE/bioventing more costly (i.e., approximately $192,000) for additional excavation and no demolition with the possibility of being less effective. Additionally, two buildings would require excavation in order to remove potentially contaminated soils from underneath. Therefore, *in situ* treatment is the preferred cleanup option because it is effective at reducing contamination, can effectively remediate contamination located beneath structures, and is more cost effective than excavating the increased soil-contaminant volumes. New estimates have been generated for the differences in the remedy and are attached in Appendix A. The new estimates for the SVE/bioventing system at Site 56 is estimated at $272,158.

### 3.2.2 Significant Differences to the Selected Remedy at Site 59

Since cleanup levels of contaminated soils were not achieved to complete the remediation of Site 59, and removal of the required soils and replacement of existing structures would be cost prohibitive, installation of an SVE/bioventing system is recommended. Additionally, installation of vapor extraction wells will allow additional soil gas data, including chlorinated solvent data, to be collected and evaluated. The status of chlorinated solvents as a potential COC at these sites may be reevaluated at the end of *in situ* treatment operation prior to system shut-down. If they are identified as COCs, and they persist at concentrations exceeding remediation standards, then continued operation of the treatment system may be required to address chlorinated solvents. Additionally, ARARs associated with remediation of chlorinated solvents will be identified at the time they are determined to be COCs. Subsurface site geology and contaminant concentrations

appear to be well suited for SVE/bioventing remediation. The following remedial actions are proposed for Site 59:

- installation of injection/extraction wells and monitoring points;
- removal of contaminated surface soil;
- pilot test to optimize the efficiency and cost of the SVE and/or the bioventing system;
- startup, operation, and maintenance of the system (including a potential switch from SVE to bioventing); and
- closure of the site after remedial goals have been met [MW, 1997b].

Preliminary information indicates SVE would be the probable remedy since the contamination may present a potential threat to groundwater and the site-specific characteristics are suitable for SVE technology. However, a pilot test will be conducted at the site to determine the levels and types of contaminants present. If the pilot test indicates levels of VOCs which warrant remediation, SVE would be selected as the preferred remedy. However, if the pilot test indicates that VOCs are not at elevated levels, then an alternate means of remediation, i.e., bioremediation, would be implemented to remediate the diesel contamination. However, depending on the results of the pilot test, it may be necessary to install a dual SVE/bioventing system.

If SVE is the chosen remedy, the USAF shall operate the SVE system until it makes the demonstration that the cleanup standard, specified in the ROD [USAF, 1996] and Table 2 of this ESD, has been met. Although chlorinated solvents (i.e., VOCs) were not confirmed as COCs at Site 59, the USAF shall continue to operate the SVE system if appropriate, after considering the following factors:

- whether the mass removal rate is approaching asymptotic levels after temporary shutdown periods and appropriate optimization of the SVE system;
- the additional cost of continuing to operate SVE system at concentrations approaching asymptotic mass levels;
- whether the predicted concentration of the leachate from the vadose zone using VLEACH or another appropriate vadose zone model that interprets soil gas data will exceed the groundwater cleanup standard;

- the predicted effectiveness and cost of further enhancements to the SVE system (e.g., additional vapor extraction wells);
- whether the cost of groundwater remediation will be significantly more if the residual vadose zone contamination is not addressed;
- whether the residual mass in the vadose zone will significantly prolong the time to attain the groundwater cleanup standard; and
- the incremental cost over time of vadose zone remediation compared to the incremental cost over time for groundwater remediation on the basis of a common unit (e.g., cost of a pound of TCE removed) provided that the underlying groundwater has not reached aquifer cleanup levels.

For costing purposes, the proposed *in situ* system for Site 59 will consist of two injection wells, three multi-level soil vapor monitoring points, a treatment unit, and various instrumentation and control valves. Following success of the pilot test and further refinement of the contaminant profile, the system would be modified as appropriate to achieve its stated objectives. Soil gas data will also be collected concurrently with the evaluation and design to further define the presence of VOC contamination. Off gas treatment is not known at this time but it is anticipated that granulated activated carbon or a more cost effective means of best available control treatment as necessary to comply with ARARs will be used. Additionally, contaminated soils were detected in a trench sample during the installation of a groundwater remediation water line. Gasoline, diesel, and motor oil were detected in the trench sample (Table 4), removal of that contamination may be incorporated into the investigation and remedial action at Site 59.

**Table 4. Groundwater Remediation Water Line Trench Sample**

| Component Analyzed | Results (mg/kg) |
|---|---|
| ***Surface Soils*** | |
| Gasoline | 710 |
| Diesel Fuel | 350 |
| Motor Oils | 59 |
| t-Butylbenzene | 1.4 |
| p-Cymene (p-Isopropyltoluene) | 1.9 |

**Table 4. Groundwater Remediation Water Line Trench Sample (Continued)**

| Component Analyzed | Results (mg/kg) |
|---|---|
| Naphthalene | 0.310 |
| n-Propylbenzene | 1.0 |

mg/kg = milligrams per kilogram

The cost of the original alternative of excavation with *ex situ* bioremediation and on base disposal was estimated at $86,513. This alternative excavated shallow soils and used *ex situ* bioremediation to treat the soil followed by onbase disposal. It was chosen as the preferred cleanup option because it provided the most cost-effective removal of the contaminated soil. However, based on the amount of soils excavated at the site and the concentration of the in place soils, the Remedial Action Contractor estimated the volume of soil remaining in place to be approximately five times the original estimate. This made excavation as compared to SVE/bioventing more costly (i.e., approximately $322,000) with the possibility of being less effective. Therefore, *in situ* is the preferred cleanup option because it is more cost effective than excavating the increased soil volumes, can effectively remediate beneath existing structures, and is effective at reducing contaminant levels. New estimates have been generated for the differences in the remedy and are attached in Appendix A. The new estimates for the SVE/bioventing system at Site 59 is estimated at $272,158.

### *3.2.3 Significant Differences to the Selected Remedy at Site 60*

Since cleanup levels of the contaminated soils were not achieved to complete the remediation of Site 59, an existing hanger building cannot be demolished, and removal of the required soils would be cost prohibitive, the installation of an *in situ* treatment system is recommended to treat the soil at Site 60. Additionally, installation of vapor extraction wells will allow additional soil gas data, including chlorinated solvent data, to be collected and evaluated. The status of chlorinated solvents as a potential COC at these sites may be reevaluated at the end of *in situ* treatment operation prior to system shut-down. If they are identified as COCs, and they persist at concentrations exceeding remediation standards, then continued operation of the treatment system may be required to address chlorinated solvents.

Additionally, ARARs associated with remediation of chlorinated solvents will be identified at the time they are determined to be COCs. The following remedial steps are proposed for Site 60:

- installation of injection/extraction wells and monitoring points;
- pilot test to optimize the efficiency and cost of the SVE and/or the bioventing system;
- startup, operation, and maintenance of the system; and
- closure of the site after remedial goals have been met [MW, 1997b].

Preliminary information indicates SVE would be the probable remedy since the contamination may present a potential threat to groundwater and the site-specific characteristics are suitable for SVE technology. However, a pilot test will be conducted at the site to determine the levels and types of contaminants present. If the pilot test indicates levels of VOCs which warrant remediation, SVE would be selected as the preferred remedy. However, if the pilot test indicates that VOCs are not at elevated levels, then an alternate means of remediation, i.e., bioremediation, would be implemented to remediate the diesel contamination. However, depending on the results of the pilot test, it may be necessary to install a dual SVE/bioventing system.

If SVE is the chosen remedy, the USAF shall operate the SVE system until it makes the demonstration that the cleanup standard, specified in the ROD [USAF, 1996] and Table 3 of this ESD, has been met. Although chlorinated solvents (i.e., VOCs) were not confirmed as COCs at Site 60, the USAF shall continue to operate the SVE system if appropriate, after considering the following factors:

- whether the mass removal rate is approaching asymptotic levels after temporary shutdown periods and appropriate optimization of the SVE system;

- the additional cost of continuing to operate SVE system at concentrations approaching asymptotic mass levels;

- whether the predicted concentration of the leachate from the vadose zone using VLEACH or another appropriate vadose zone model that interprets soil gas data will exceed the groundwater cleanup standard;

- the predicted effectiveness and cost of further enhancements to the SVE system (e.g., additional vapor extraction wells);

- whether the cost of groundwater remediation will be significantly more if the residual vadose zone contamination is not addressed;

- whether the residual mass in the vadose zone will significantly prolong the time to attain the groundwater cleanup standard; and

- the incremental cost over time of vadose zone remediation compared to the incremental cost over time for groundwater remediation on the basis of a common unit (e.g., cost of a pound of TCE removed) provided that the underlying groundwater has not reached aquifer cleanup levels.

For costing purposes, the proposed *in situ* system for Site 60 will consist of one treatment well, two multi-probe soil vapor monitoring points, a treatment unit, and assorted instrumentation and control valves. Following success of the pilot test and further refinement of the contaminant profile, the system would be modified to achieve its stated objectives. Soil gas data will also be collected concurrently with the evaluation and design to further define the presence of VOC contamination. Off gas treatment is not known at this time but it is anticipated that granulated activated carbon or a more cost effective means of best available control treatment as necessary to comply with ARARs will be used.

The cost of the original alternative of excavation with *ex situ* bioremediation and on base disposal was estimated at $33,088. This alternative excavated shallow soils and used *ex situ* bioremediation to treat the soil followed by onbase disposal. It was chosen as the preferred cleanup option because it provided the most cost-effective removal of contamination. However, based on the amount of soils excavated at the site and the concentration of the in place soils, the Remedial Action Contractor estimated the volume of soil remaining in place to be approximately three times the original estimate. The presence of an actively used hangar building does not warrant removal of the building and underlying soil contamination, backfilling the excavation, and construction of a new building. This, combined with the increased estimate of contaminated soil, would make excavation of this prohibitive. Therefore, *in situ* is the preferred cleanup option because it is effective at reducing contaminant levels, can effectively remediate beneath structures, and is more cost effective than excavating the increased soil volumes and demolishing/rebuilding the existing building. New estimates have been generated for the differences in the remedy and are attached in Appendix A. The new estimates for the SVE/bioventing system at Site 60 is estimated at $266,304.

### 3.3 Compliance with Applicable or Relevant and Appropriate Requirements

There are several requirements governing the changes in remedies that must now be considered. These requirements are defined in CERCLA Section 117(c) as ARARs which are identified and discussed within this ESD. Compliance with these identified ARARs are required by this ESD to perform the cleanup of Sites 56, 59, and 60.

There are three categories of ARARs that a remedial action must comply with in addition to being protective of human health and the environment. The categories include chemical-specific requirements that establish numerical standards such as chemical concentration; action-specific requirements are usually technology- or activity-based requirements or limitation on actions; and location-specific requirements which place restrictions on remedial activities solely because they are in specific locations. Requirements are further categorized as federal or state with the more stringent ARAR being identified in this ESD and put into effect.

#### 3.3.1 Federal and State Chemical-Specific Applicable or Relevant and Appropriate Requirements

There are no new chemical-specific federal or state ARARs identified for the remedial action changes at Sites 56, 59, and 60.

#### 3.3.2 Federal and State Location-Specific Applicable or Relevant and Appropriate Requirements

There are no new location-specific federal or state ARARs identified for the remedial action changes at Sites 56, 59, and 60.

#### 3.3.3 Federal and State Action-Specific Applicable or Relevant and Appropriate Requirements

There are no new action-specific federal or state ARARs identified for the remedial action changes at Sites 56, 59, and 60.

## 4.0 Affirmation of the Statutory Determinations

Considering the new information that has been developed and the changes that have been made to the selected remedial actions within this ESD, the USAF, USEPA, and the State of California believe that the remedies remain protective of human health and the environment, comply with federal and state requirements that are applicable or relevant and appropriate to these remedial actions, and are cost-effective. In addition, the revised remedies utilize permanent solutions and alternative treatment technologies to the maximum extent practicable for these sites. The addition of *in situ* treatment by SVE/bioventing, which was analyzed as an alternative in the feasibility study and discussed in the proposed plan for Sites 56, 59, and 60, supplement the selected remedy of excavation, *ex situ* bioremediation treatment, and onbase disposal. The USEPA and the State of California agree, based on site-specific factors, that an ESD is an appropriate level of documentation for the selected remedy changes.

Albert F. Lowas, Jr.
Director, Air Force Base Conversion Agency
U.S. Air Force

November 27, 1998
Date

## 5.0 References

IT Corporation (IT), 1993, *U.S. Air Force Installation Restoration Program, Final Technical Memorandum for Group 3 Sites for Mather Air Force Base, California*, Prepared by IT Corporation for Environmental Management Operations.

IT Corporation (IT), 1995a, *Groundwater Operable Unit and Soil Operable Unit Focused Feasibility Study Report for Mather Air Force Base, California*, prepared by IT Corporation for Air Force Center for Environmental Excellence (AFCEE), Brooks Air Force Base, Texas.

IT Corporation (IT), 1995b, *Final Comprehensive Mather Baseline Risk Assessment (CBRA) Mather Air Force Base, California*, prepared by IT Corporation for AFCEE, Brooks Air Force Base, Texas, December 19, 1995.

IT Corporation (IT), 1995c, *Proposed Plan for Environmental Cleanup at the Groundwater Operable Unit Plumes and Soil Operable Unit Sites,* Mather Air Force Base Superfund Site, U.S. Air Force Base conversion Agency, Mather Air Force Base, Sacramento, California, May 1995.

Montgomery Watson, 1997a, "Draft Final Closure Report for Soil Operable Unit Site 65 and Remedial Action Characterization Report for Soil Operable Unit Sites 56, 59, 60, and 62," Prepared for AFCEE, April 1997.

Montgomery Watson, 1997b, "Draft Technical Plans and Quality Program Plan for Remedial Action at Sites 56 and 60 and Monitoring Well Installation at Site 82," prepared for AFCEE, September, 1997.

U.S. Environmental Protection Agency (USEPA), 1989, *Interim Final Guidance on Preparing Superfund Decision Documents*, June, 1989.

United States Air Force (USAF), 1996, *Final Superfund Record of Decision Soil Operable Unit Sites and Groundwater Operable Unit Plumes Mather Air Force Base, Sacramento County, California*, prepared by IT Corporation for AFCEE, Brooks Air Force Base, Texas, April 1996.

United States Air Force (USAF), 1989, *Federal Facility Agreement under CERCLA*, U.S. Department of the Air Force, Mather Air Force Base, California, October 10, 1989.

# *Appendix A*
# *Cost Estimates*

## I. Soil Vapor Extraction/Biovent Pilot Study

**Capital Costs:**

**MONTH 0: $7,590**
**MONTH 2: $2,134**

A. Installation of SVE Wells — $1,600

| | | |
|---|---|---|
| Assume | 1 | extraction wells |
| Assume | 40 | lf depth per extraction well |
| Assume | $40 | /lf well completion cost |

B. Installation of Passive Injection Wells — $1,600

| | | |
|---|---|---|
| Assume | 1 | passive injection wells |
| Assume | 40 | lf depth per injection well |
| Assume | $40 | /lf well completion cost |

C. SVE System — $3,000

Assume 100 cfm vapor recovery rate
Rental of Vapor Extraction blower and assoicated equipment:
$1,500 /month

D. Connection of Wells to SVE Unit — $700

| | | |
|---|---|---|
| Assume | 100 | lf of 4" PVC piping per well |
| Installation cost = | $7 | /lf (including labor and materials) |

E. Post Treatment Confirmation Sampling (Month 2) — $1,940

1. Borehole Installation — $800

| | | |
|---|---|---|
| Assume | 2 | confirmation boreholes |
| Assume | $10 | /lf for drilling a borehole |
| Assume | 40 | lf depth per borehole |

2. Confirmation Sampling — $1,140

| | | |
|---|---|---|
| Assume | 1 | samples per borehole |
| Assume 20% QA samples required | | |
| Assume | $20 | per sample for data validation |

Sample Analysis (per sample):

| | |
|---|---|
| EPA 8015 Modified - TPH as gasoline | $115 /sample |
| EPA 8015 Modified - TPH as diesel | $105 /sample |
| EPA 8010/8020 - VOCs | $235 /sample |

F. Cost Contingency

1. Assume a 10% Contingency of Month 0 Costs — $690

2. Assume a 10% Contingency of Month 2 Costs — $194

| **Operation and Maintenance Costs:** | **MONTHS 1-2:** | **$665** |
|---|---|---|
| A. Utility Costs<br>Assume $1.00 /hr utility rate | $1,440 | |
| B. Labor (maintenance)<br>Assume 2 technicians for 4 hours per week<br>Assume chargeout rate for technicians at $44/hour | $2,816 | |
| C. Performance Assessment Monitoring<br>Assume 1 sample event per month<br>Assume total cost for sampling and analysis = $1,500/event | $3,000 | |
| D. Cost Contingency<br>Assume a 10% Contingency of O&M Costs | $726 | |

## PRESENT WORTH CALCULATIONS

**Soil Vapor Extraction/Bioventing - Pilot Study**

*ANNUAL DISCOUNT RATE = 5%*

| MONTH | CAPITAL COST | O&M COST | DISCOUNT FACTOR | ANNUAL EXPENDITURE | PRESENT WORTH |
|---|---|---|---|---|---|
| 0 | $7,590 | $0 | 1.0000 | $7,590 | $7,590 |
| 1 | $0 | $665 | 0.996 | $665 | $662 |
| 2 | $7,656 | $665 | 0.9920 | $8,321 | $8,255 |
| TOTALS | $15,246 | $1,330 | | | $16,507 |

**TOTAL COST OF SVE/BIOVENTING -PILOT STUDY** ***$16,507***

## I. Soil Vapor Extraction/Biovent at Site 56 and 59

**Capital Costs:** **YEAR 0: $90,208**
**YEAR 4: $7,656**

A. Biovent Pilot Study $16,507
Sec attached estimate to complete pilot study

B. Installation of additional SVE Wells $1,600
Assume 1 extraction wells
Assume 40 lf depth per extraction well
Assume $40 /lf well completion cost

C. Installation of additional Passive Injection Wells $3,200
Assume 2 passive injection wells
Assume 40 lf depth per injection well
Assume $40 /lf well completion cost

D. SVE System $15,000
Assume 100 cfm vapor recovery rate
Cost for centrifugal exhauster = $5,000
Cost for ancillary equipment = $10,000

E. Connection of Wells to SVE Unit $700
Assume 100 lf of 4" PVC piping per well
Installation cost = $7 /lf (including labor and materials)

F. Concrete Pad/Metal Building $2,000
Assume a 20' x 20' pad
Pad Installation cost = $5 /square foot (including labor and materials)

G. Security Fencing (Installed) $3,000
Assume 8 feet high, chain-link
Assume 120 lf of fencing
Installation cost = $25 /lf (including labor and materials)

H. Labor $40,000
Assume total cost for project oversight and labor = $40,000

I. Post Treatment Confirmation Sampling (Year 4) $6,160
1. Borehole Installation $1,600
Assume 4 confirmation boreholes
Assume $10 /lf for drilling a borehole
Assume 40 lf depth per borehole

2. Confirmation Sampling $4,560

Assume 2 samples per borehole
Assume 20% QA samples required
Assume $20 per sample for data validation
Sample Analysis (per sample):

| | | |
|---|---|---|
| EPA 8015 Modified - TPH as gasoline | $115 | /sample |
| EPA 8015 Modified - TPH as diesel | $105 | /sample |
| EPA 8010/8020 - VOCs | $235 | /sample |

J. Extraction Well/Borehole Abandonment (Year 4) $800

Assume 5 extraction wells/boreholes
Assume 40 lf deep wells/boreholes
Assume $4 /lf of grouting

K. Cost Contingency

1. Assume a 10% Contingency of Year 0 Costs $8,201

2. Assume a 10% Contingency of Year 4 Costs $696

## Operation and Maintenance Costs: YEARS 1-4: $49,570

A. Utility Costs $8,760

Assume $1.00 /hr utility rate

B. Labor (maintenance) $18,304

Assume 2 technicians for 4 hours per week
Assume chargeout rate for 2 technicians at $44/hour

C. Performance Assessment Monitoring $18,000

Assume 1 sample event per month
Assume total cost for sampling and analysis = $1,500/event

D. Cost Contingency $4,506

Assume a 10% Contingency of O&M Costs

## II. Soil Vapor Extraction/Biovent at Site 60

**Capital Costs:** **YEAR 0: $87,568**
**YEAR 4: $3,740**

A. Biovent Pilot Study — $16,507
See attached estimate to complete pilot study

B. Installation of additional SVE Wells — $1,200
Assume 1 extraction wells
Assume 30 lf depth per extraction well
Assume $40 /lf well completion cost

C. Installation of additional Passive Injection Wells — $1,200
Assume 1 passive injection wells
Assume 30 lf depth per injection well
Assume $40 /lf well completion cost

D. SVE System — $15,000
Assume 100 cfm vapor recovery rate
Cost for centrifugal exhauster = $5,000
Cost for ancillary equipment = $10,000

E. Connection of Wells to SVE Unit — $700
Assume 100 lf of 4" PVC piping per well
Installation cost = $7 /lf (including labor and materials)

F. Concrete Pad/Metal Building — $2,000
Assume a 20' x 20' pad
Pad Installation cost = $5 /square foot (including labor and materials)

G. Security Fencing (Installed) — $3,000
Assume 8 feet high, chain-link
Assume 120 lf of fencing
Installation cost = $25 /lf (including labor and materials)

H. Labor — $40,000
Assume total cost for project oversight and labor = $40,000

I. Post Treatment Confirmation Sampling (Year 4) — $3,080
1. Borehole Installation — $800
Assume 2 confirmation boreholes
Assume $10 /lf for drilling a borehole
Assume 40 lf depth per borehole

2. Confirmation Sampling $2,280

Assume 2 samples per borehole
Assume 20% QA samples required
Assume $20 per sample for data validation
Sample Analysis (per sample):

| | | |
|---|---|---|
| EPA 8015 Modified - TPH as gasoline | $115 | /sample |
| EPA 8015 Modified - TPH as diesel | $105 | /sample |
| EPA 8010/8020 - VOCs | $235 | /sample |

J. Extraction Well/Borehole Abandonment (Year 4) $320

Assume 2 extraction wells/boreholes
Assume 40 lf deep wells/boreholes
Assume $4 /lf of grouting

K. Cost Contingency

1. Assume a 10% Contingency of Year 0 Costs $7,961

2. Assume a 10% Contingency of Year 4 Costs $340

## Operation and Maintenance Costs: YEARS 1-4: $49,570

A. Utility Costs $8,760

Assume $1.00 /hr utility rate

B. Labor (maintenance) $18,304

Assume 2 technicians for 4 hours per week
Assume chargeout rate for 2 technicians at $44/hour

C. Performance Assessment Monitoring $18,000

Assume 1 sample event per month
Assume total cost for sampling and analysis = $1,500/event

D. Cost Contingency $4,506

Assume a 10% Contingency of O&M Costs

## PRESENT WORTH CALCULATIONS

**Site 56 - Soil Vapor Extraction/Bioventing**

*ANNUAL DISCOUNT RATE = 5%*

| YEAR | CAPITAL COST | O&M COST | DISCOUNT FACTOR | ANNUAL EXPENDITURE | PRESENT WORTH |
|---|---|---|---|---|---|
| 0 | $90,208 | $0 | 1.0000 | $90,208 | $90,208 |
| 1 | $0 | $49,570 | 0.9524 | $49,570 | $47,211 |
| 2 | $0 | $49,570 | 0.9070 | $49,570 | $44,960 |
| 3 | $0 | $49,570 | 0.8638 | $49,570 | $42,819 |
| 4 | $7,656 | $49,570 | 0.8206 | $57,226 | $46,960 |
| TOTALS | $97,864 | $198,282 | | | $272,158 |

**TOTAL COST OF SITE 56 SVE/BIOVENTING** ***$272,158***

**Site 59 - Soil Vapor Extraction/Bioventing**

*ANNUAL DISCOUNT RATE = 5%*

| YEAR | CAPITAL COST | O&M COST | DISCOUNT FACTOR | ANNUAL EXPENDITURE | PRESENT WORTH |
|---|---|---|---|---|---|
| 0 | $90,208 | $0 | 1.0000 | $90,208 | $90,208 |
| 1 | $0 | $49,570 | 0.9524 | $49,570 | $47,211 |
| 2 | $0 | $49,570 | 0.9070 | $49,570 | $44,960 |
| 3 | $0 | $49,570 | 0.8638 | $49,570 | $42,819 |
| 4 | $7,656 | $49,570 | 0.8206 | $57,226 | $46,960 |
| TOTALS | $97,864 | $198,282 | | | $272,158 |

**TOTAL COST OF SITE 59 SVE/BIOVENTING** ***$272,158***

**Site 60 - Soil Vapor Extraction/Bioventing**
*ANNUAL DISCOUNT RATE = 5%*

| YEAR | CAPITAL COST | O&M COST | DISCOUNT FACTOR | ANNUAL EXPENDITURE | PRESENT WORTH |
|---|---|---|---|---|---|
| 0 | $87,568 | $0 | 1.0000 | $87,568 | $87,568 |
| 1 | $0 | $49,570 | 0.9524 | $49,570 | $47,211 |
| 2 | $0 | $49,570 | 0.9070 | $49,570 | $44,960 |
| 3 | $0 | $49,570 | 0.8638 | $49,570 | $42,819 |
| 4 | $3,740 | $49,570 | 0.8206 | $53,310 | $43,747 |
| TOTALS | $91,308 | $198,282 | | | $266,304 |

TOTAL COST OF SITE 60 SVE/BIOVENTING *$266,304*

# *Appendix B*
# *Response to Regulatory Comments on the Draft Explanation of Significant Differences*

**California Regional Water Quality Control Board (CRWQCB)**
**Central Valley Region**
**James D. Taylor (9 March 98)**

CRWQCB 1. Comment: Section 1.0, page 1, second paragraph: The second sentence should be revised to read, "Subsurface contamination in excess of designated cleanup levels and the presence of *chlorinated solvents (e.g., PCE, TCE) in soil gas*, unknown hydrocarbons, *and potentially new constituents of concern (COCs)* requires continued investigation and further cleanup."

**Response: Comment Noted. Text has been changed to read: "The proposed remedy provides an opportunity to investigate the presence and significance of subsurface contamination in excess of designated cleanup levels and the presence of chlorinated solvents (e.g., PCE, TCE) in soil gas, and potentially new contaminants of concern (COCs)."**

CRWQCB 2. Comment: Section 1.0, page 1, third paragraph: The last sentence should be revised to read, "The USEPA and the State of California will have a thirty-day opportunity to dispute *the Draft Final* ESD, in accordance..."

**Response: Comment Accepted. Text has been changed to read: "...to dispute the Draft Final ESD in accordance..."**

CRWQCB 3. Comment: Figure 2 - page 5, Figure 3 - page 7, and Figure 4 - page 8: All three figures do not include a legend or indicate the areas that were previously excavated, the potential location of the treatment systems, or the location of any remaining surface contamination targeted for excavation (e.g., Site 59). These figures should be revised to allow easier review of the ESD by the public.

**Response: Comment Accepted. All three figures were revised to indicate delineated areas of previous excavations and to aid in the identification of major site features. Approximate locations of treatment systems were located as depicted in the Technical Plans.**

CRWQCB 4. Comment: Section 3.1.1, page 13: The last part of this section should more fully address the chlorinated solvents or VOCs detected at Site 56 (The term chlorinated hydrocarbons used in the last sentence is a

generic term that includes chlorinated volatiles, semi-volatiles, and pesticides. A more specific term such as chlorinated solvents or VOCs should be used when referring to volatile compounds such as TCE and PCE). This section should be revised to include the specific relevant information documented in the Group 3 Soil Organic Vapor (SOV) data for Site 56, a reference to the document where this information is located, and a brief narrative on the significance of the information in the ESD. For example, this section should be revised and state that the Group 3 SOV data indicated TCE up to 1,200 ppm and PCE up to 240 ppm at Site 56. Further, the ESD should indicate that the Air Force will collect additional field data that may result in the identification of additional COCs. For instance, soil gas data for chlorinated solvents to the depth of groundwater will be collected concurrent with the evaluation and design of the treatment system for this site. If VOCs are encountered in significant concentrations, they will become COCs, and cleanup levels must be determined as they were for VOCs in the ROD. These comments also apply to Sections 3.1.2 and 3.1.3 for Sites 59 and 60, respectively (see attached Board comment letter dated 17 March 1997 on the Draft Closure Report).

**Response:** **Comment Accepted. Section 3.1.1, last sentence; this sentence has been deleted. Text in Group 3 Report referencing TCE up to 1200 ppm and PCE up to 240 ppm was incorrect. The analytical data tables have the correct data which is in units of parts per billion (ppb). Additionally text has been added to Section 3.2.1, first paragraph, third sentence, to read: "Installation of vapor extraction wells will allow additional soil gas data, including chlorinated solvent data, to be collected and evaluated." and Section 3.2.1, second paragraph, added second to last sentence as follows: "Soil gas data will also be collected concurrently with the evaluation and design to further define the presence of VOC contamination." This same change will also be made in Sections 3.2.2 and 3.2.3.**

CRWQCB 5. Comment: Section 3.1.3, page 14: Delete the word "bank" from the third sentence of this section.

**Response:** **Comment Accepted. "Bank" has been deleted from the sentence.**

CRWQCB 6. Comment: Section 3.2.1, page 15: The first paragraph of this section states that excavation is recommended for shallow soils in the unlined ditch at Site 56. However the remedial actions proposed in the bullets do not include excavation. A bullet should be added that includes, "Excavation of shallow soils as appropriate," to address this possibility.

**Response: Comment Noted. The first two sentences in this section have been deleted.**

CRWQCB 7. Comment: Section 3.2.2, page 16: The last sentence of the second paragraph states that contaminated surface soil was discovered during the installation of groundwater Remediation water line. A brief narrative on this contamination should be included in the ESD which describes when the contamination was discovered, what action was taken, the concentration and type of contamination encountered, and why this contamination is being addressed in this ESD. The location of this contamination should also be indicated on Figure 3, page 6.

**Response: Comment Accepted. Changed text of last sentence to read: "Additionally, contaminated soils were detected in a trench sample during the installation of a groundwater Remediation water line. Gasoline, diesel, and motor oil were detected in the trench sample (Table 4), removal of that contamination may be incorporated into the investigation and remedial action at Site 59."**

CRWQCB 8. Comment: Section 3.2.3, page 17: In the first paragraph second sentence, replace the term chlorinated hydrocarbon with chlorinated solvents or VOCs (see Specific Comment 4).

**Response: Comment Noted. This sentence has been deleted.**

CRWQCB 9. Comment: Sections 3.2.1, 3.2.2, and 3.2.3: These sections must make reference to the ROD criteria for constructing and operating a SVE system, modification of the remedial system from SVE to bioventing, and the shut off criteria for SVE or bioventing (Shut-off criteria, Site 57, Section 2.2.9.7, page 2-43 and 44, criteria to build and operate an SVE system, Site 7/11, Section 2.2.9.1, page 2.32, and Sites 37/39/54, Section 2.2.9.5, page 2-40, in the Soil and Groundwater ROD).

**Response:** **Comment Accepted. Based on preliminary data, it is anticipated that SVE would be the chosen remedial alternative. However, pilot tests will be conducted to confirm this assumption. Therefore, bioremediation or another remedy may be appropriate if the need for SVE is not confirmed. SVE shutoff criteria has been added to the ESD in the anticipation of its usage; however, this does not necessarily mean that SVE will be utilized. Text from the Soil OU and Groundwater OU ROD referencing shut-off criteria and criteria to operate and SVE system will be modified for the site-specific conditions and added to the ESD. The criteria to build the SVE is not applicable (i.e., the system is currently built) and will not be included in this ESD.**

CRWQCB 10. Comment: Appendix A - Cost Estimates: We do not concur with the cost estimates presented in Appendix A, pages A5 and A6. The fundamental problem is that the present worth calculations for O&M costs over a twelve year period appears inaccurate. Based on our experience at similar sites, the period to accomplish SVE and/or bioventing should not reasonably exceed 2 to 3 years. There is no evidence that these systems would need to be operated for twelve years or even 5 years. In addition, in the capital costs presented in Appendix A, pages A-1 through A-4, the cost to complete a pilot study of $50,000, and labor costs of $40,000 appear excessive and amount to approximately 65 percent of the initial capital costs for each site. Considering how small these systems will be initially (1 or 2 extraction wells and 2 or 3 passive wells) a pilot study should be much less expensive and easily accomplished. The labor cost for O&M (which assumes 2 technicians for 4 hours per week) also appears excessive.

**Response:** **Comment Accepted. Consistent with SVE/Bioventing pilot test results obtained from Site 10C and Air Force project budget estimates, the cost estimates have been revised utilizing a four year treatment period. A cost estimate has been included as an attachment to the ESD to show changes to the budget (i.e., O&M labor).**

**California Department of Toxic Substances Control**
**Linda D. Hogg (9 March 1998)**

DTSC 1. Comment: Page 1, Section 1. The comment that Section 117 (c) of CERCLA requires an ESD is incorrect. That section requires that an ESD be public noticed.

**Response: Comment Accepted. Text has been revised to read: "Section 117 (c) of CERCLA requires that if proposed actions differ in any significant respects from the final actions agreed to in the ROD, the lead agency (i.e., Air Force) must publish an explanation of the significant differences and the reasons such changes were made."**

DTSC 2. Comment: Based on the comments for the rest of the document, the Introduction will need to be rewritten to more accurately summarize the reason for the ESD.

**Response: Comment Accepted. Section 1.0, second paragraph; text has been revised to provide an overview what the preferred alternatives were, what was actually done at the sites, and what the proposed changes.**

DTSC 3. Comment: The three maps (Figures 2, 3, and 4) are inadequate. They do not have the locations of the actual Oil Water Separators (OWS) marked, they do not show the extent of the former excavations and they have unnecessary lines and markings that are not related to the ESD. Please provide an overall base map to show the location of these sites in relation to each other and to the other IRP sites.

**Response: Comment Accepted. See response to comment CRWQCB 3.**

DTSC 4. Comment: Section 2.2.1. The discussion of the alternative selected in the ROD should be discussed in the past tense, not the present. The remedy has already been selected and tried. The present tense should be reserved for the new proposed remedy in the ESD. This should help eliminate confusion as to which remedy the document is discussing. The same holds true for the discussion on Sites 59 and 60.

**Response:** **Comment Accepted. Text in Sections 2.2.1, 2.2.2, and 2.2.3 has been changed to past tense to represent the work that was done under that alternative.**

DTSC 5. Comment: Section 3.1.1. This section does not really explain the basis for the ESD. Currently, this section reads as though the AF did not want to do further excavation. Why? Were there physical barriers to further excavation, were there construction regulations that prevented further excavation, what would the cost be to continue deeper or more horizontal excavations? A selected remedy should be used until the cleanup standard are achieved or until it is demonstrated that the additional cost to continue outweighs the benefit of continuing with the selected remedy or the new remedy provides a better chance of achieving the cleanup standards.

**Response:** **Comment Accepted. Discussions have been added which demonstrate the cost impacts associated with the greater than anticipated volumes. Also, text has been added to discuss demolition impacts. A sentence has been added to Section 3.1.1 as follows: "Furthermore, demolition of Buildings 2898 and 2991 would be required to pursue excavation as a remedial alternative, these buildings have currently been slated for use by the county."**

DTSC 6. Comment: Section 3.1.2. Again, why is a total of 7,500 $yd^3$ an unacceptable amount of excavation, if the remedial cleanup standards can be reached? The basis for the ESD needs to be better defined. Also, what if any attempt has been made to determine the identity of the unknown hydrocarbons at these sites? (The description of the excavation results for Site 60 in Section 3.1.3 is best of the three sections.)

**Response:** **Comment Accepted. Discussions have been added which demonstrate the cost impacts associated with the greater than anticipated volumes. Also, text has been added to discuss demolition impacts. Add last sentence to Section 3.1.2 as follows: "Furthermore, demolition of Building 4249 and the concrete washrack would be required to pursue excavation as a remedial alternative." The unknown hydrocarbons will be considered gasoline or diesel when determining if they meet site cleanup standards.**

DTSC 7. Comment: Section 3.2.1. This section has a very brief discussion on cost comparisons. It states that the cost of the original excavation remedy was $47,582 and the cost for the Soil Vapor Extraction (SVE) remedy will be $587,350. How is this second number more cost effective than the first? The text needs to better explain the cost differences. What is the cost to continue excavation and bioremediation? In addition, the cost estimates need to justify the twelve (12) year Operation and Maintenance (O&M) time frame and the high cost of the SVE remedy.

**Response: Comment Accepted. Cost estimates have been revised to reflect a more realistic four year time frame. Additional text has been added which compares the cost estimates for the alternatives in addition to the uncertainties associated with the current alternative.**

DTSC 8. Comment: Section 3.2.2. The same comments on Section 3.2.1 apply here. In addition, the text needs to more fully document the statement concerning the contaminated soil discovered during the installation of the groundwater Remediation line. How will this additional load on the system affect the SVE system?

**Response: Comment Accepted. See response to CRWQCB 7.**

DTSC 9. Comment: Section 3.2.3. Has there been any follow-up work to determine the identity, concentration and location of the Volatile Organic Compounds (VOCs) at Site 60?

**Response: Comment Noted. Monitoring wells are currently being installed at Site 60 for the pilot SVE system. Soil gas samples are being collected; however, no sample results are currently available. It is anticipated that data will be available approximately mid-April 1998.**

DTSC 10. Comment: Section 3.3. The document states that the ESD requires new or different Applicable or Relevant and Appropriate Requirements (ARARs) than found in the Soils and Groundwater ROD. The ARARs listed in Table 4 of the ESD are already listed in the ROD. Since the ESD is proposing to change the remedy from excavation to SVE, it stands to reason that the cleanup standards would change. The ESD does not discuss how the original proposed cleanups standards would now be confirmed using the SVE remedy. Will the AF use standard models to compare vapor levels

to estimated soil levels? Also, if new VOCs are detected and determined to be Constituents of Concern, they must have cleanup standards set.

**Response:** **Comment Accepted. No numerical values have been established for VOC COCs. The COCs would be identified based upon VLEACH modeling results consistent with the Basewide OU and Soil OU FFS. However, narrative standards in the form of SVE shutoff criteria would be used and have been included in this section. The ARARs have been revised to include only ARARs related to that portion of the remedy which is changed by the ESD. The ARARs that have already been identified in the Groundwater and Soils OU ROD will not be included. The ARARs identified in the ROD were not associated with any particular site, therefore it is assumed that they can apply to the change in remedies discussed in the ESD.**

DTSC 11. Comment: Section 4.0. The last sentence should be changed to more accurately reflect that the changes in the ESD DO CHANGE the remedies. The language should be consistent with the introduction section and should comply with U.S. EPA's letter on this ESD.

**Response:** **Comment Accepted. The last sentence of Section 4.0 was removed and text was added as follows: "The change at Sites 56, 59, and 60 from excavation to excavation followed by SVE/Bioventing would constitute a fundamental change in the hazardous management approach and therefore ordinarily would require a ROD amendment. However, regulatory agency's are in agreement that site-specific factors dictate that an ESD is an appropriate documentation of the selected remedy changes."**

DTSC 12. Comment: Section 5.0. The references should contain those documents that provide the basis for the changes proposed in the ESD. That includes any sampling data documents and the final technical plans for these sites. Reference #4 has a typo for Site 82 (says Site 8).

**Response:** **Comment Noted. Changes proposed by this ESD are based upon documents that are currently listed in the reference section. The typo in reference number 4 was eliminated to read "Site 82" instead of "Site 8".**

DTSC 13.

a. The signature block for Mr. Landis should be changed to read the same as in the ROD:

Anthony J. Landis, P.E.
Chief, Northern California Operations
Office of Military Facilities
Department of Toxic Substances Control
California Environmental Protection Agency

**Response:** **Comment Noted. The signature block for Anthony Landis has been removed.**

b. Neither this ESD nor the September 1997 Technical Plans for Site 56, 60 and Site 82 contains an explanation on how the radius of influence for the SVE wells was determined? Are these estimates based on ongoing SVE operations on base? Is the geology the same for those current operations as Sites 56, 59 and 60? What size pump or blower is proposed for these systems and again, what is the basis for that decision?

**Response:** **Comment Noted. Estimations for Sites 56 and 60 were based on recommendations made by Montgomery Watson in the Draft Technical Plans and Quality Program Plan For Remedial Action at Sites 56 and 60. No estimates were provided for Site 59; however, assumptions were consistent with those presented for Site 56.**

c. What attempts have been made to determine and document the possible source of trichloroethylene (TCE) north of building 2892, at soil sample site S56?

**Response:** **Comment Noted. Of all of the investigations conducted at the site, only the SOV survey (Group 3, 1993) encountered TCE above detectable concentrations in soil gas. Consequently, TCE is not considered as a COC at this site.**

**U.S. Environmental Protection Agency (EPA)**
**Kathleen Salyer (March 25, 1998)**

USEPA 1 Comment: The Air Force should specify the treatment, if any, for the SVE off-gas.

**Response: Comment Noted. Section 3.2.1, second paragraph, following the last sentence, Section 3.2.2, second paragraph, following the second sentence, and to Section 3.2.3, second paragraph, following the last sentence; text has been added to read: "Off gas treatment is not known at this time but it is anticipated that granulated activated carbon or a more cost effective means of best available control treatment as necessary to comply with ARARs will be used."**

USEPA 2 Comment: Page 5, Figure 2, Site 56 - Please delineate the estimated extent of contamination and delineate the extent of previous excavation.

**Response: Comment Accepted. See response to CRWQCB 3.**

USEPA 3 Comment: Page 7, Figure 3 - Show the location of the former OWS, delineate the known extent of contamination, and extent of previous excavation.

**Response: Comment Accepted. See response to CRWQCB 3.**

USEPA 4 Comment: Page 8, Figure 4 - Same comment as comment number three.

**Response: Comment Accepted. See response to CRWQCB 3.**

USEPA 5 Comment: Page 13, Section 3.1: there are two typos in the second sentence - "extend and supersedes" - that need to be corrected.

**Response: Comment Accepted. Text has been corrected.**

USEPA 6 Comment: Page 13, Section 3.1.1 - The Air Force noted that chlorinated solvents may also be present at Site 56. If the Air Force encounters chlorinated solvents in concentrations that make them COCs, the cleanup criteria established in the ROD for these COCs must be met. The ESD should reflect this. Additionally, if the VOCs are present in the soil in quantities that cause the soil to exceed the toxicity criteria for hazardous waste or the chemical is a listed

hazardous waste, then the Air Force must cite as ARARs the California Hazardous Waste Control Law appropriate for the unit. Specifically, the SVE unit should be identified as a RCRA miscellaneous unit. If a thermal destruction unit will be utilized, the SVE unit should be defined for purposes of applying the RCRA ARARs as an incinerator. (For further information please see EPA comment letter to the Air Force dated March 24, 1998 concerning the applicability of RCRA regulation as ARARs for vadose zone clean-up at Mather.)

**Response:** **Comment Noted. If VOCs are identified as COCs, appropriate cleanup goals would be established at that time. The Air Force legal department is currently reviewing the ARARs and will be discussing this issue with the RPMS in the near future.**

USEPA 7 Comment: Page 15, Section 3.2.1: The basis for the change to SVE/Bioventing has not been adequately explained or justified. The articulation for this decision for Site 59 - see p. 16, Section 3.2.2 - is better.

**Response:** **Comment Accepted. The first sentence has been changed to read: "Due to the unknown volume of contaminated soil and the limitations on excavation because of the high value of an existing hanger, the installation of an *in situ*..." See response to DTSC 5 for further clarification.**

USEPA 8 Comment: Page 17, Section 3.2.3 Again, the basis of the change to SVE at Site 60 needs to be explained.

**Response:** **Comment Accepted. The first sentence has been changed to read: "Due to the unknown volume of contaminated soil and the limitations on excavation because of the high value of an existing hanger, the installation of an *in situ* treatment system...". Also for clarification the following sentences have been added to Section 3.1.3, first paragraph, following the last sentence to read: "Complete excavation of all contaminated soils proved to be impractical due to the high value of the hanger overlying the potentially contaminated soils. The cost of demolition and reconstruction of this building would make this option cost prohibitive."**

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| USEPA 9 | Comment: | Pages 19 and 20: If the ARARs on these pages were identified in the ROD, there is no need to have them restated here. In other words, we only need these ARARs if they were not in the ROD (see comment number 6) |
| | **Response:** | **Comment Accepted. Applicable or relevant and appropriate requirements which were previously identified in the Groundwater OU and Soils OU ROD have been removed.** |
| USEPA 10 | Comment: | Appendix A - The cost estimates are based on 12 years of operation and maintenance. Since it is highly unlikely that the SVE/Bioventing systems will run that long, the cost estimates are overly inflated. The cost estimates should be revised to reflect a reasonable expected duration of operation. |
| | **Response:** | **Comment Accepted. See response to CRWQCB 10.** |